In [1]:
```python
import numpy as np
import pandas as pd
```

In [2]:
```python
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
from sklearn.linear_model import LogisticRegression
from sklearn.ensemble import RandomForestClassifier
from xgboost import XGBClassifier
from sklearn.model_selection import train_test_split
from matplotlib import pyplot
from sklearn.metrics import accuracy_score
import warnings
warnings.filterwarnings('ignore')
from sklearn.naive_bayes import MultinomialNB, BernoulliNB
from sklearn.metrics import classification_report
from sklearn import metrics
```

In [3]:
```python
df=pd.read_csv('Stress-Lysis.csv')
df.head()
```

Out[3]:

	Humidity	Temperature	Step_count	Stress_Level
0	21.33	90.33	123	1
1	21.41	90.41	93	1
2	27.12	96.12	196	2
3	27.64	96.64	177	2
4	10.87	79.87	87	0

In [4]:
```python
df.shape
```

Out[4]: (2001, 4)

In [5]:
```python
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2001 entries, 0 to 2000
Data columns (total 4 columns):
 #   Column        Non-Null Count  Dtype
---  ------        --------------  -----
 0   Humidity      2001 non-null   float64
 1   Temperature   2001 non-null   float64
 2   Step_count    2001 non-null   int64
 3   Stress_Level  2001 non-null   int64
dtypes: float64(2), int64(2)
memory usage: 62.7 KB
```

In [6]:
```python
df.describe()
```

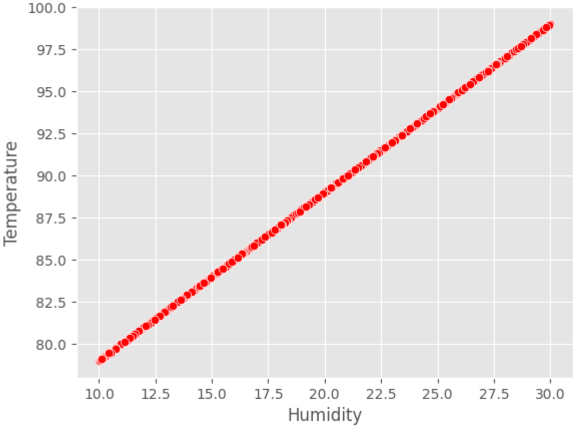
Out[6]:

	Humidity	Temperature	Step_count	Stress_Level
count	2001.000000	2001.000000	2001.000000	2001.000000
mean	20.000000	89.000000	100.141429	1.104448
std	5.777833	5.777833	58.182948	0.771094
min	10.000000	79.000000	0.000000	0.000000
25%	15.000000	84.000000	50.000000	0.000000
50%	20.000000	89.000000	101.000000	1.000000
75%	25.000000	94.000000	150.000000	2.000000
max	30.000000	99.000000	200.000000	2.000000

In [7]:
```python
df['Stress_Level'].unique()
```

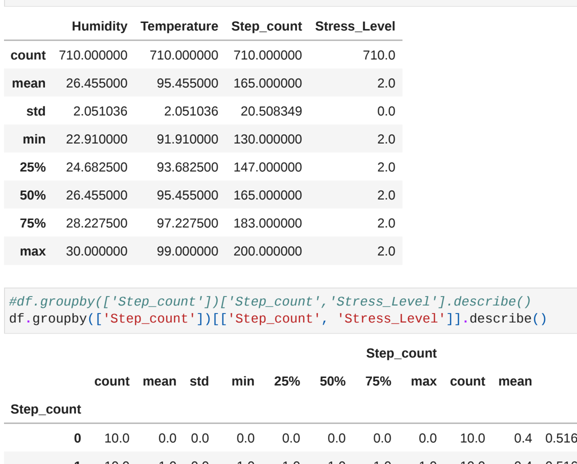
Out[7]: array([1, 2, 0], dtype=int64)

In [8]:
```python
#style.use('ggplot')
#sns.countplot(df['Stress_Level'])

import matplotlib.pyplot as plt
import seaborn as sns

# Set the ggplot style
plt.style.use('ggplot')

# Create the count plot
sns.countplot(df['Stress_Level'])

# Show the plot
plt.show()
```



In [9]:
```python
#sns.scatterplot(df['Humidity'],df['Temperature'],hue=df['Red'])
sns.scatterplot(data=df, x='Humidity', y='Temperature', color='Red')
```

Out[9]: <Axes: xlabel='Humidity', ylabel='Temperature'>



In [10]:
```python
grouped=df.groupby(df['Stress_Level'])
```

In [11]:
```python
grouped.get_group(2).describe()
```

Out[11]:

	Humidity	Temperature	Step_count	Stress_Level
count	[illegible]	[illegible]	[illegible]	[illegible]
mean	[illegible]	[illegible]	[illegible]	[illegible]
std	[illegible]	[illegible]	[illegible]	[illegible]
min	[illegible]	[illegible]	[illegible]	[illegible]
25%	[illegible]	[illegible]	[illegible]	[illegible]
50%	[illegible]	[illegible]	[illegible]	[illegible]
75%	[illegible]	[illegible]	[illegible]	[illegible]
max	[illegible]	[illegible]	[illegible]	[illegible]

In [12]:
```python
df.groupby(['Step_count'])[['Step_count','Stress_Level']].describe()
```

Out[12]:

[illegible]

201 rows × 16 columns

In [13]:
```python
sns.heatmap(df.corr(),cmap='Greens',annot=True,square=True)
```

Out[13]: <Axes: >

In [14]:
```python
x=df.iloc[:,:-1]
y=df.iloc[:,-1]
x.shape,y.shape
```

Out[14]: ((2001, 3), (2001,))

In [15]:
```python
xtrain,xtest,ytrain,ytest=train_test_split(x,y,test_size=0.20,random_state=20)
xtrain.shape,xtest.shape,ytrain.shape,ytest.shape
```

Out[15]: ((1600, 3), (401, 3), (1600,), (401,))

In [16]:
```python
from sklearn.linear_model import LogisticRegression
logreg=LogisticRegression(random_state=42)
logreg.fit(xtrain,ytrain)
```

Out[16]:
```
LogisticRegression
LogisticRegression(random_state=42)
```

In [17]:
```python
from sklearn.neighbors import KNeighborsClassifier
knn=KNeighborsClassifier(n_neighbors=24,metric='minkowski',p=2)
knn.fit(xtrain,ytrain)
```

Out[17]:
```
KNeighborsClassifier
KNeighborsClassifier(n_neighbors=24)
```

In [18]:
```python
from sklearn.svm import SVC
svc=SVC(kernel='linear',random_state=42)
svc.fit(xtrain,ytrain)
```

Out[18]:
```
SVC
SVC(kernel='linear', random_state=42)
```

In [19]:
```python
#Decision tree Algo
from sklearn.tree import DecisionTreeClassifier
dectree=DecisionTreeClassifier(criterion='entropy',random_state=42)
dectree.fit(xtrain,ytrain)
```

Out[19]:
```
DecisionTreeClassifier
DecisionTreeClassifier(criterion='entropy', random_state=42)
```

In [20]:
```python
#Random forest ALgo
from sklearn.ensemble import RandomForestClassifier
ranfor=RandomForestClassifier(n_estimators=11,criterion='entropy',random_state=42)
ranfor.fit(xtrain,ytrain)
```

Out[20]:
```
RandomForestClassifier
RandomForestClassifier(criterion='entropy', n_estimators=11, random_state=42)
```

In [21]:
```python
from sklearn.linear_model import SGDClassifier
sgd=SGDClassifier(loss="hinge",shuffle=True,random_state=101)
sgd.fit(xtrain,ytrain)
```

Out[21]:
```
SGDClassifier
SGDClassifier(random_state=101)
```

In [22]:
```python
MNB = MultinomialNB()
BNB = BernoulliNB()
SVM = SVC()
MNB.fit(xtrain, ytrain)
BNB.fit(xtrain, ytrain)
SVM.fit(xtrain, ytrain)
pred_mnb = MNB.predict(xtest)
pred_bnb = BNB.predict(xtest)
pred_svm = SVM.predict(xtest)
```

In [23]:
```python
# Multinomial Accuracy
print(f'Multinomial Accuracy: {accuracy_score(ytest, pred_mnb)}')

print(classification_report(ytest, pred_mnb))
print('MAE:',metrics.mean_absolute_error(ytest,pred_mnb))
print('MSE:',metrics.mean_squared_error(ytest,pred_mnb))
print(' Root MSE:',np.sqrt(metrics.mean_squared_error(ytest,pred_mnb)))
```

```
Multinomial Accuracy: 0.7182044887780549
              precision    recall  f1-score   support

           0       0.61      0.66      0.63        99
           1       0.70      0.50      0.58       158
           2       0.80      1.00      0.89       144

    accuracy                           0.72       401
   macro avg       0.70      0.72      0.70       401
weighted avg       0.71      0.72      0.70       401

MAE: 0.2817955112219451
MSE: 0.2817955112219451
 Root MSE: 0.5308441496540629
```

In [24]:
```python
# Bernoulli Accuracy

print(f'Bernoulli Accuracy: {accuracy_score(ytest, pred_bnb)}')

print(classification_report(ytest, pred_bnb))
print('MAE:',metrics.mean_absolute_error(ytest,pred_bnb))
print('MSE:',metrics.mean_squared_error(ytest,pred_bnb))
print(' Root MSE:',np.sqrt(metrics.mean_squared_error(ytest,pred_bnb)))
```

```
Bernoulli Accuracy: 0.3940149625935162
              precision    recall  f1-score   support

           0       0.00      0.00      0.00        99
           1       0.39      1.00      0.57       158
           2       0.00      0.00      0.00       144

    accuracy                           0.39       401
   macro avg       0.13      0.33      0.19       401
weighted avg       0.16      0.39      0.22       401

MAE: 0.6059850374064838
MSE: 0.6059850374064838
 Root MSE: 0.7784504078016041
```

In [25]:
```python
# SVM Accuracy
print(f'SVM Accuracy: {accuracy_score(ytest, pred_svm)}')

print(classification_report(ytest, pred_svm))
print('MAE:',metrics.mean_absolute_error(ytest,pred_svm))
print('MSE:',metrics.mean_squared_error(ytest,pred_svm))
print(' Root MSE:',np.sqrt(metrics.mean_squared_error(ytest,pred_svm)))
```

```
SVM Accuracy: 0.9975062344139651
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        99
           1       0.99      1.00      1.00       158
           2       1.00      0.99      1.00       144

    accuracy                           1.00       401
   macro avg       1.00      1.00      1.00       401
weighted avg       1.00      1.00      1.00       401

MAE: 0.0024937655860349127
MSE: 0.0024937655860349127
 Root MSE: 0.04993761694389223
```

In [26]:
```python
# Logistic Regression

Y_pred_logreg = logreg.predict(xtest)
accuracy_logreg = accuracy_score(ytest, Y_pred_logreg)
print("Logistic Regression: " + str(accuracy_logreg * 100))
print(classification_report(ytest, Y_pred_logreg))
from sklearn import metrics
print('Mean Absolute Error:', metrics.mean_absolute_error(ytest, Y_pred_logreg))
print('Mean Squared Error:', metrics.mean_squared_error(ytest, Y_pred_logreg))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(ytest, Y_pred_logreg)))
```

```
Logistic Regression: 100.0
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        99
           1       1.00      1.00      1.00       158
           2       1.00      1.00      1.00       144

    accuracy                           1.00       401
   macro avg       1.00      1.00      1.00       401
weighted avg       1.00      1.00      1.00       401

Mean Absolute Error: 0.0
Mean Squared Error: 0.0
Root Mean Squared Error: 0.0
```

In [27]:
```python
# Linear Regression


from sklearn.linear_model import LinearRegression
lreg = LinearRegression().fit(xtrain, ytrain)
Y_pred_lreg = lreg.predict(xtest)
accuracy_lreg = accuracy_score(ytest, Y_pred_lreg.round())
print("Linear Regression: " + str(accuracy_lreg * 100))
from sklearn import metrics
print('Mean Absolute Error:', metrics.mean_absolute_error(ytest, Y_pred_lreg))
print('Mean Squared Error:', metrics.mean_squared_error(ytest, Y_pred_lreg))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(ytest, Y_pred_lreg)))
```

```
Linear Regression: 98.75311720698254
Mean Absolute Error: 0.2346212801640908
Mean Squared Error: 0.07473048087890018
Root Mean Squared Error: 0.27336876353910694
```

In [28]:
```python
# LinearDiscriminantAnalysis


from sklearn.discriminant_analysis import LinearDiscriminantAnalysis
lda = LinearDiscriminantAnalysis().fit(xtrain, ytrain)
Y_pred_lda = lda.predict(xtest)
accuracy_lda = accuracy_score(ytest, Y_pred_lda)
print("LinearDiscriminantAnalysis: " + str(accuracy_lda * 100))
print(classification_report(ytest, Y_pred_lda))
from sklearn import metrics
print('Mean Absolute Error:', metrics.mean_absolute_error(ytest, Y_pred_lda))
print('Mean Squared Error:', metrics.mean_squared_error(ytest, Y_pred_lda))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(ytest, Y_pred_lda)))
```

```
LinearDiscriminantAnalysis: 97.0074812967581
              precision    recall  f1-score   support

           0       0.93      1.00      0.97        99
           1       1.00      0.92      0.96       158
           2       0.97      1.00      0.98       144

    accuracy                           0.97       401
   macro avg       0.97      0.97      0.97       401
weighted avg       0.97      0.97      0.97       401

Mean Absolute Error: 0.029925187032418952
Mean Squared Error: 0.029925187032418952
Root Mean Squared Error: 0.17298897951146758
```

In [29]:
```python
# Ridge


from sklearn.linear_model import Ridge
clf = Ridge(alpha=1.0)
#Fitting the classifier into training set
clf.fit(xtrain,ytrain)
y_pred_ridge=clf.predict(xtest)
accuracy_ridge = accuracy_score(ytest, y_pred_ridge.round())
print("Ridge: " + str(accuracy_ridge * 100))
from sklearn import metrics
print('Mean Absolute Error:', metrics.mean_absolute_error(ytest, y_pred_ridge))
print('Mean Squared Error:', metrics.mean_squared_error(ytest, y_pred_ridge))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(ytest, y_pred_ridge)))
```

```
Ridge: 98.75311720698254
Mean Absolute Error: 0.23462124895460276
Mean Squared Error: 0.0747302901092936
Root Mean Squared Error: 0.2733684146153202
```

In [30]:
```python
# Lasso

from sklearn.linear_model import Lasso
clf=Lasso(alpha=1.0)
#Fitting the classifier into training set
clf.fit(xtrain,ytrain)
y_pred_lasso=clf.predict(xtest)
accuracy_lasso = accuracy_score(ytest, y_pred_lasso.round())
print("Lasso: " + str(accuracy_lasso * 100))
from sklearn import metrics
print('Mean Absolute Error:', metrics.mean_absolute_error(ytest, y_pred_lasso))
print('Mean Squared Error:', metrics.mean_squared_error(ytest, y_pred_lasso))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(ytest, y_pred_lasso)))
```

```
Lasso: 77.3067331670823
Mean Absolute Error: 0.3303579699697452
Mean Squared Error: 0.16874732468751705
Root Mean Squared Error: 0.41078866182931223
```

In [31]:
```python
#K Nearest neighbors

Y_pred_knn = knn.predict(xtest)
accuracy_knn = accuracy_score(ytest, Y_pred_knn)
print("K Nearest neighbors: " + str(accuracy_knn * 100))
print(classification_report(ytest, Y_pred_knn))

from sklearn import metrics
print('Mean Absolute Error:', metrics.mean_absolute_error(ytest, Y_pred_knn))
print('Mean Squared Error:', metrics.mean_squared_error(ytest, Y_pred_knn))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(ytest, Y_pred_knn)))
```

```
K Nearest neighbors: 99.75062344139651
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        99
           1       0.99      1.00      1.00       158
           2       1.00      0.99      1.00       144

    accuracy                           1.00       401
   macro avg       1.00      1.00      1.00       401
weighted avg       1.00      1.00      1.00       401

Mean Absolute Error: 0.0024937655860349127
Mean Squared Error: 0.0024937655860349127
Root Mean Squared Error: 0.04993761694389223
```

In [32]:
```python
# SVC( Support Vector Classifier)

Y_pred_svc = svc.predict(xtest)
accuracy_svc = accuracy_score(ytest, Y_pred_svc)
print("Support Vector Classifier: " + str(accuracy_svc * 100))
print(classification_report(ytest, Y_pred_svc))

from sklearn import metrics
print('Mean Absolute Error:', metrics.mean_absolute_error(ytest, Y_pred_svc))
print('Mean Squared Error:', metrics.mean_squared_error(ytest, Y_pred_svc))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(ytest, Y_pred_svc)))
```

```
Support Vector Classifier: 100.0
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        99
           1       1.00      1.00      1.00       158
           2       1.00      1.00      1.00       144

    accuracy                           1.00       401
   macro avg       1.00      1.00      1.00       401
weighted avg       1.00      1.00      1.00       401

Mean Absolute Error: 0.0
Mean Squared Error: 0.0
Root Mean Squared Error: 0.0
```

In [33]:
```python
# Decision Tree

Y_pred_dectree = dectree.predict(xtest)
accuracy_dectree = accuracy_score(ytest, Y_pred_dectree)
print("Decision tree: " + str(accuracy_dectree * 100))
print(classification_report(ytest, Y_pred_dectree))

from sklearn import metrics
print('Mean Absolute Error:', metrics.mean_absolute_error(ytest, Y_pred_dectree))
print('Mean Squared Error:', metrics.mean_squared_error(ytest, Y_pred_dectree))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(ytest, Y_pred_dectree)))
```

```
Decision tree: 100.0
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        99
           1       1.00      1.00      1.00       158
           2       1.00      1.00      1.00       144

    accuracy                           1.00       401
   macro avg       1.00      1.00      1.00       401
weighted avg       1.00      1.00      1.00       401

Mean Absolute Error: 0.0
Mean Squared Error: 0.0
Root Mean Squared Error: 0.0
```

In [34]:
```python
# Random Forest

Y_pred_ranfor = ranfor.predict(xtest)
accuracy_ranfor = accuracy_score(ytest, Y_pred_ranfor)
print("Random Forest: " + str(accuracy_ranfor * 100))
print(classification_report(ytest, Y_pred_ranfor))

from sklearn import metrics
print('Mean Absolute Error:', metrics.mean_absolute_error(ytest, Y_pred_ranfor))
print('Mean Squared Error:', metrics.mean_squared_error(ytest, Y_pred_ranfor))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(ytest, Y_pred_ranfor)))
```

```
Random Forest: 100.0
              precision    recall  f1-score   support

           0       1.00      1.00      1.00        99
           1       1.00      1.00      1.00       158
           2       1.00      1.00      1.00       144

    accuracy                           1.00       401
   macro avg       1.00      1.00      1.00       401
weighted avg       1.00      1.00      1.00       401

Mean Absolute Error: 0.0
Mean Squared Error: 0.0
Root Mean Squared Error: 0.0
```

In [35]:
```python
#SGD(Stochastic Gradient Classifier)


Y_pred_sgd = sgd.predict(xtest)
accuracy_sgd = accuracy_score(ytest, Y_pred_sgd)
print("Stochastic Gradient Classifier: " + str(accuracy_sgd * 100))
print(classification_report(ytest, Y_pred_sgd))

from sklearn import metrics
print('Mean Absolute Error:', metrics.mean_absolute_error(ytest, Y_pred_sgd))
print('Mean Squared Error:', metrics.mean_squared_error(ytest, Y_pred_sgd))
print('Root Mean Squared Error:', np.sqrt(metrics.mean_squared_error(ytest, Y_pred_sgd)))
```

```
Stochastic Gradient Classifier: 97.50623441396509
              precision    recall  f1-score   support

           0       1.00      0.95      0.97        99
           1       0.96      0.98      0.97       158
           2       0.98      0.99      0.98       144

    accuracy                           0.98       401
   macro avg       0.98      0.97      0.98       401
weighted avg       0.98      0.98      0.98       401
```

```
Mean Absolute Error: 0.02493765586034913
Mean Squared Error: 0.02493765586034913
Root Mean Squared Error: 0.15791661046371636
```